Re: Effectiveness of reconstruction of the anterior cruciate ligament with quadrupled hamstrings and bone-patellar tendon-bone autografts

Diercks, Ron L.; Halbertsma, Jan P.; Zee, Mark

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Letter to the Editor

Prof Ron L. Diercks and Jan P. Halbertsma

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Letter to the Editor

Dear Editor:

In the article "Effectiveness of Reconstruction of the Anterior Cruciate Ligament With Quadrupled Hamstrings and Bone-Patellar Tendon-Bone Autografts: An In Vivo Study Comparing Tibial Internal-External Rotation" by Chouliaras, Ristanis, Moraiti, Stergiou, and Georgoulis (February 2007, pages 189-196), the authors concluded that "neither of the 2 most frequently used autografts for ACL reconstruction can restore tibial rotation to normal levels in an activity such as pivoting after descending stairs."

They based this conclusion on the result of an in vivo gait analysis. Their protocol was described as the following: "After foot contact, the subjects were instructed to immediately pivot (externally rotate) on the landing (ipsilateral) leg at 90° and walk away from the stairway. While pivoting, the contralateral leg was swinging around the body (as it was coming down from the stairway) and the trunk was oriented perpendicularly to the stairway."

By making this movement, the body of the subject indeed makes an external rotation movement in respect to the foot on which the person is standing, but the tibia of the standing leg is internally rotating in respect to the femur; that is, an internal rotation movement of the knee takes place.

However, the excessive tibial rotation after ACL injury, which occurs during higher demand activities (eg, pivoting), is external rotation of the knee. After re-evaluating this research protocol, we suspect that by measuring the internal rotation during this study, instead of measuring the external rotation, which is the "pivoting" motion, the conclusion of the authors can be based on a wrong assumption.

We would like the authors to explain why they used this procedure instead of a procedure in which external rotation of the knee was measured.

Prof Ron L. Diercks, MD, PhD
Jan P. Halbertsma, PhD
Mark Zee
Sports Medicine Center
Groningen University Medical Center
Groningen, the Netherlands

Authors' Response: We would like to thank Dr Diercks and his group for their interest in our research work. However, we believe that they misapprehended our methodology.

First, our evaluation period starts from foot contact. After foot contact and for the leg that is evaluated, there is a natural mandatory knee flexion phase that is part of shock absorption. During this phase, the tibia rotates internally. Following this phase, the tibia starts to rotate externally as the contralateral leg swings around. Our evaluation period concludes when the contralateral leg contacts the ground again. Therefore our evaluation period, as clearly depicted in Figure 1, and in several other of our publications,[1-4] includes both an internal and an external rotation of the tibia. In addition, we did not evaluate how much internal or external rotation we have during this evaluation period by using peaks to avoid the error of "absolute" values. We used the total range of motion of tibial rotation during the evaluation period. This is why we never spoke in our publication(s) about internal or external rotation but only for range of motion of tibial rotation. Therefore, your argument that we evaluated only internal rotation is inaccurate.

Furthermore, we are uncertain about what you mean by "rotation of the knee." The knee is a joint and is composed of 2 segments. The knee cannot rotate; the tibia or the femur can rotate. Depending on how you define your coordinate system, you can identify rotation of the segment in question with respect to global or local coordinates. There are several textbooks where you can further study this methodology with respect to in vivo measurements and kinematic analysis.

Finally, our work is based on a "correct assumption" because we have always evaluated range of motion of tibial rotation. We have always been interested in challenging the knee with rotational loads and exploring if reconstruction techniques are successful in restoring excessive tibial rotation. In the majority of our studies, we have incorporated a "double" control group because we used as control both the intact legs of the ACL reconstructed groups and a completely healthy group of subjects. In addition, and in the current study, the 2 ACL groups are matched, and the patients were randomly assigned in the 2 ACL reconstructed groups. This is the closest you can get to a randomized control trial in orthopaedic surgery.

Prof N. Stergiou, PhD
Nebraska Biomechanics Core Facility
University of Nebraska at Omaha
Omaha, Nebraska
Prof A. D. Georgoulis, MD
Orthopaedic Sports Medicine Center of Ioannina
University of Ioannina
Ioannina, Greece

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